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DEVELOPING SYSTEMS THINKING: IN-CLASS ROLE PLAY HIGHLIGHTING THE DIFFERENCE BETWEEN DETAILED COMPLEXITY AND DYNAMIC COMPLEXITY

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ABSTRACT

It is clear that today's managers and managers of tomorrow are facing a business world that is both complex and constantly changing. As a result business schools, at the program level, and individual instructors, at the course level, continue to emphasize the importance of integrative thinking and the cross-functional nature of business. This manuscript describes one classroom activity that can help students gain a greater understanding of the systems thinking, in general, and dynamic and detailed complexity, specifically. The activity can be used by instructors in any functional area who wish to apply the concepts to a realistic setting.

Keywords: systems thinking, pedagogy, dynamic and detailed complexity

I. INTRODUCTION

It is clear that today's managers and managers of tomorrow (i.e., current business school students) are facing a business world that is both complex and constantly changing. As a result business schools, at the program level, and individual instructors, at the course level, continue to emphasize the importance of integrative thinking and the cross-functional nature of business. One concept or approach that can play a significant role in helping students increase their integrative or cross-functional perspectives and skills is systems thinking; an approach that has its management-oriented roots from the 1960s and one that has been discussed heavily in Peter Senge's work geared around developing learning organizations [e.g., Senge, 1990]. Recent research [Atwater, Kannan &

Stephens, 2008] has found that while many faculty members report that systems thinking is an important concept and skill, few understand the concept completely and thus, few teach the concept completely. For example, Atwater et al. found that faculty members tended to focus on the interrelated, detail-oriented nature of systems, but did not emphasize the dynamic nature of systems or the interaction between parts and between the external environment and a system's parts. The focus of this manuscript is to describe one role-play technique we use in combination with traditional lectures on systems thinking to help students understand both the detailed complexity of systems and the dynamic complexity of systems.

II. THE ROLE PLAY ACTIVITY

We have routinely used this activity in a team-taught, junior-level business course that integrates each of the five primary management disciplines (i.e., management information systems, human resources management, marketing management, financial management, and operations management). While the course includes a variety of topics and student backgrounds, the activity is one that helps lay the groundwork for systems-oriented lectures in each of the areas, and provides a framework for presentations and projects in the course. Therefore, the activity is appropriate for functional or cross-functional courses; any setting where one goal is to help students understand, develop, and apply systems thinking.

PREPARATION

Key features of the role-play activity are: 1) the topic is familiar to students with limited business background, 2) the script/story is both realistic and current, and 3) the storyline is one that involves decision making in a setting that is complex at each cross-section in time and over time. Given these criteria, we wrote a script centered on the clothing industry in the United States from the 1970s to present time. The setting is meetings involving decision makers in an imaginary clothing retailer; faced with making the same basic decision at different points in time; namely how to source the manufacturing of their clothing. To

include realistic information in the script we gathered general information about the history of the apparel industry and trade issues, and added key words related to topics we had or would talk about in the course (e.g., margin costs, GATT). The script is included in Appendix A, and can be used as-is, or can serve as a guide for writing a script about a different setting.

Few resources are needed to perform the role play activity. The activity is best performed in a room with a whiteboard or set of whiteboards. We photocopy 6 copies of the script, one for each of the roles (i.e., Manager, Accountant, Buyer, Quality Control Specialist, Marketer, and Legal) and post an electronic copy for student observers. And we bring at least two colors of dry erase pens to the classroom.

THE ACTIVITY

While the contents of the script are a critical component to the activity, the process of managing the role-play is essential for helping the students visualize and apply the systems thinking concepts (from an earlier lecture). The activity can be performed in a single class session (50 to 75 minutes).

Prior to the start of the class session (as students are arriving) we assign roles to six individuals in the class primarily based on location in the room (so that we have voices from all parts of the room). The instructor reads the manager's role and guides the timing of each statement. Those selected are given a copy of the script and told that they will only be asked to read their parts. They stay in their seats; thus, making the activity a low pressure activity that any student would be willing and able to perform.

Once the class period begins we remind the class of the systems thinking topic (from the previous lecture) and tell them that the activity we will be performing is intended to help them understand how the topics apply to business decision making and why systems thinking is important to practice. We describe the context of the role play (i.e., a set of decision makers in an imaginary U.S. apparel retailer, beginning in the 1970s) and point out that five students have been given parts to play.

We start the role play by drawing a small circle on the whiteboard, labeled, “organization” and then have the accountant and buyer from the 1970’s read their parts out loud; stopping before the marketer and quality control specialist read their parts. As the two students are reading their parts the instructor adds details to the drawing to match the information being supplied from the speaking. At this point the drawing on the board represents an apparently simple problem/system with an “obvious” solution – i.e., outsource garment manufacturing to foreign manufacturers (see Figure 1).

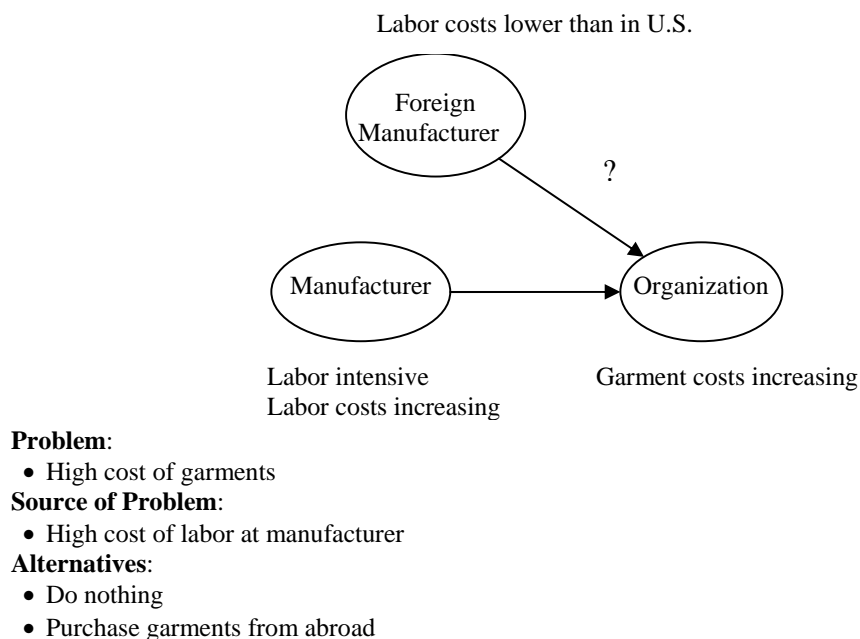


Figure 1. Detail-less System in the 1970’s

Prior to moving ahead in the script we remind students of the systems thinking material and of the need to understand the complexity of a system before making a decision. At this point we have the marketer read his or her part from the 1970’s; add some more “detail” to the drawing on the whiteboard. We then ask students to imagine how the decision would have been different if decision makers in the 1970’s hadn’t considered the marketer’s information (i.e., consumer’s preferences); making the point that understanding all of the details of

a system is critical. Once the Quality Control Specialist reads his or her part a third alternative emerges; one that was not uncommon in the 1970's.

At his point in the role play the class easily calls out the term “detailed complexity” when we ask them to tell us which systems thinking concept this example highlights. We leave the drawing, labeled “The 1970's” on the board and move to the right to start the drawing for the 1980's; replicating the drawing in Figure 2 before reading the role play. As the students read their parts (i.e., marketer, legal, and buyer) we add or subtract from the drawing using a different colored pen. The result can be seen in Figure 3. With the two figures side-by-side we are able to once again talk about “detailed complexity” and, now the term “dynamic complexity”. We make the point that because situations change decisions are not always made once (e.g., to outsource or not), but are often revisited. The differences between the 1970's drawing and the 1980's drawing (highlighted in a different color) allow us to remind students that while it is important to understand the detailed complexity of a system at any point in time, it is also important to understand the dynamic nature of a system and the environment in which the system operates. We purposely wrote the script such that the decision in both time periods was the same (i.e., to outsource the garment manufacturing or not), and to have the answer be the same (i.e., not to outsource), but for different reasons. In the 1970's the reason was consumer preferences for made-in-America. In the 1980's the reason was trade barriers on imported garments.

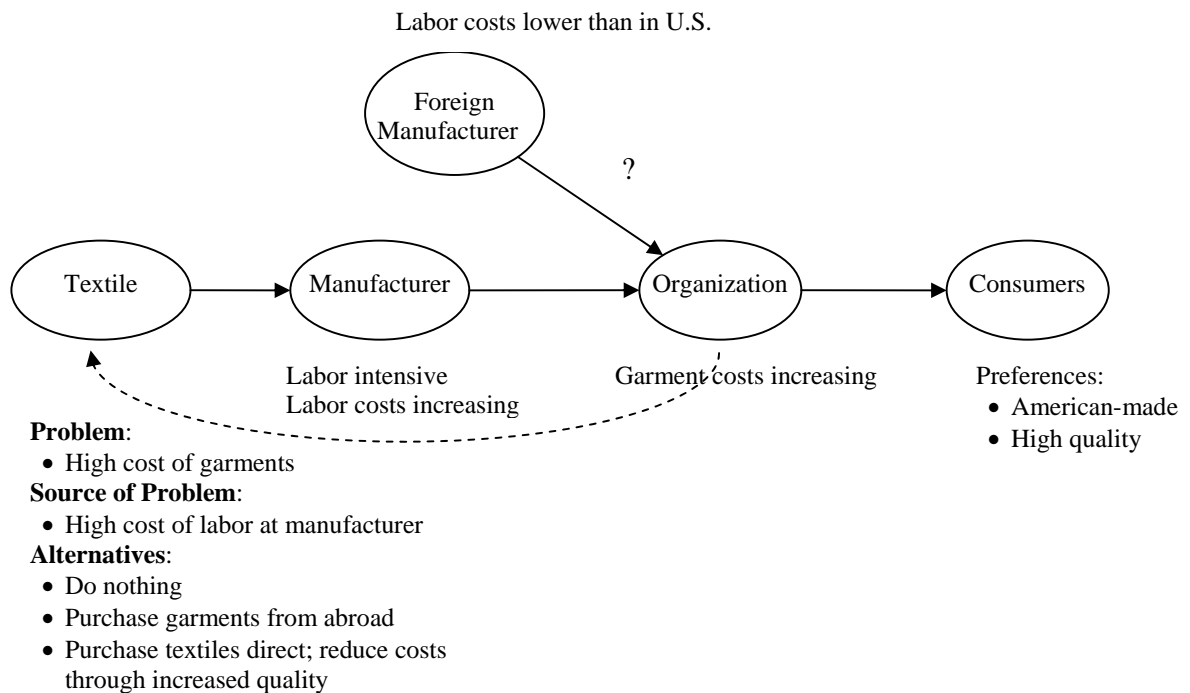


Figure 2. Detailed System in the 1970's

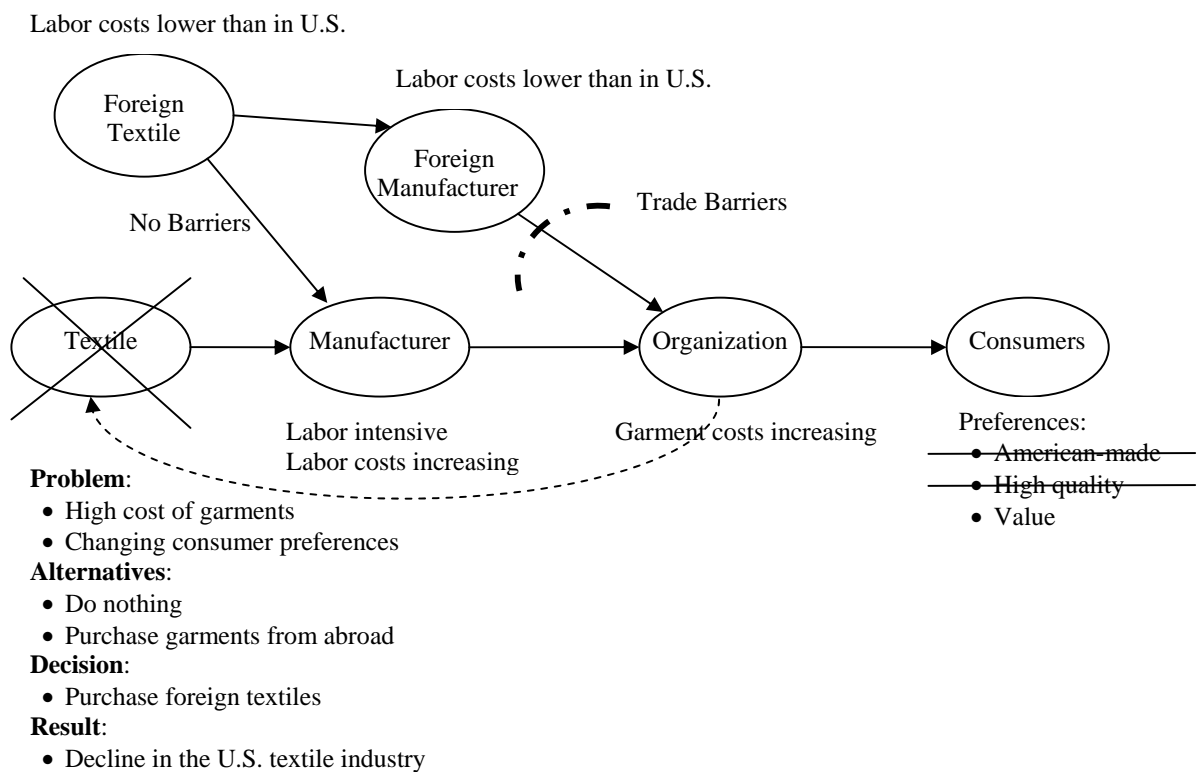


Figure 3. Detailed System in the 1980's

The remainder of the activity can be performed quickly; generally at the pace of the instructor drawing the figures on the whiteboard; briefly stopping to mention the law of unintended consequences, the interrelationship between parts in a systems, detailed and dynamic complexity, and other systems-thinking concepts as they apply. Figures for the mid-1990's, the late-1990's and the 2000s can be seen in Figures 4, 5, and 6 respectively. By the mid-1990's apparel retailers were facing the same decision, with different detailed complexities (i.e., changes in consumer preferences and trade barriers), and ultimately a different decision was made (i.e., to outsource). In the late-1990's the addition of human rights watch groups put pressure on the apparel retailer to be concerned about negative publicity (something their consumers would notice) and thus, resulted in new oversight of outsourcing companies, while continuing to outsource; and by the 2000's the situation in the outsourcing country (i.e., Northern China in this scenario) was starting to look similar to the U.S. garment industry did in the 1970's (i.e., rising labor costs).

Labor costs lower than in U.S.

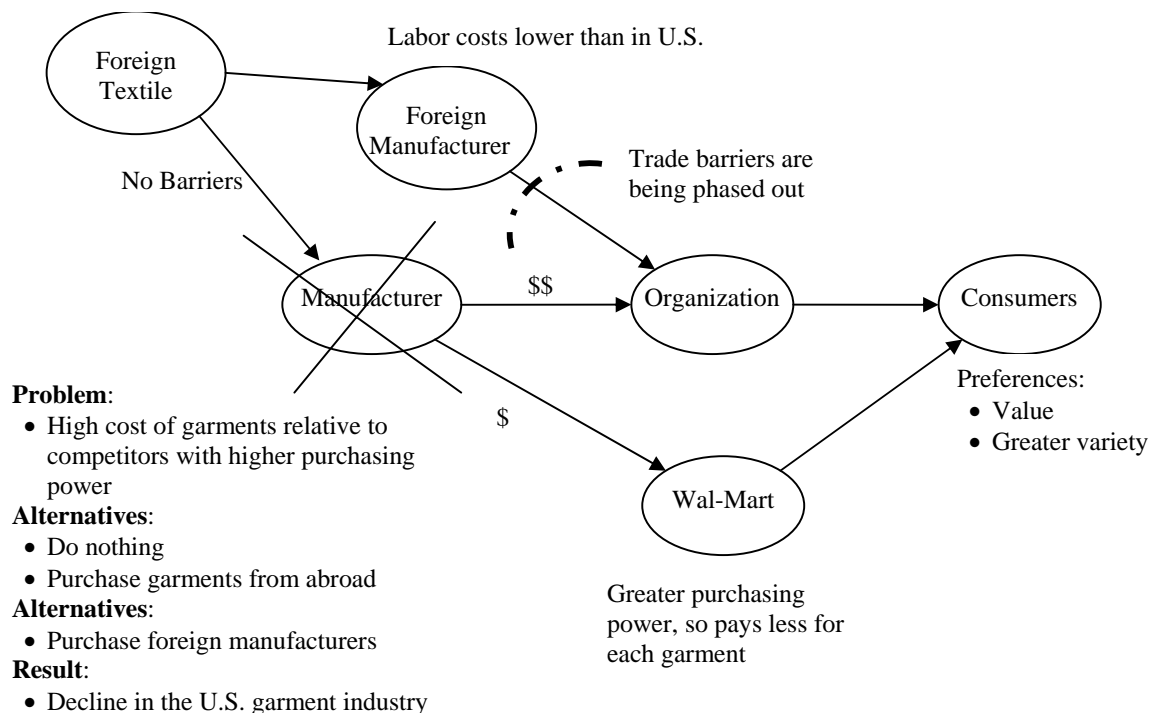


Figure 4. Detailed System in the mid-1990's

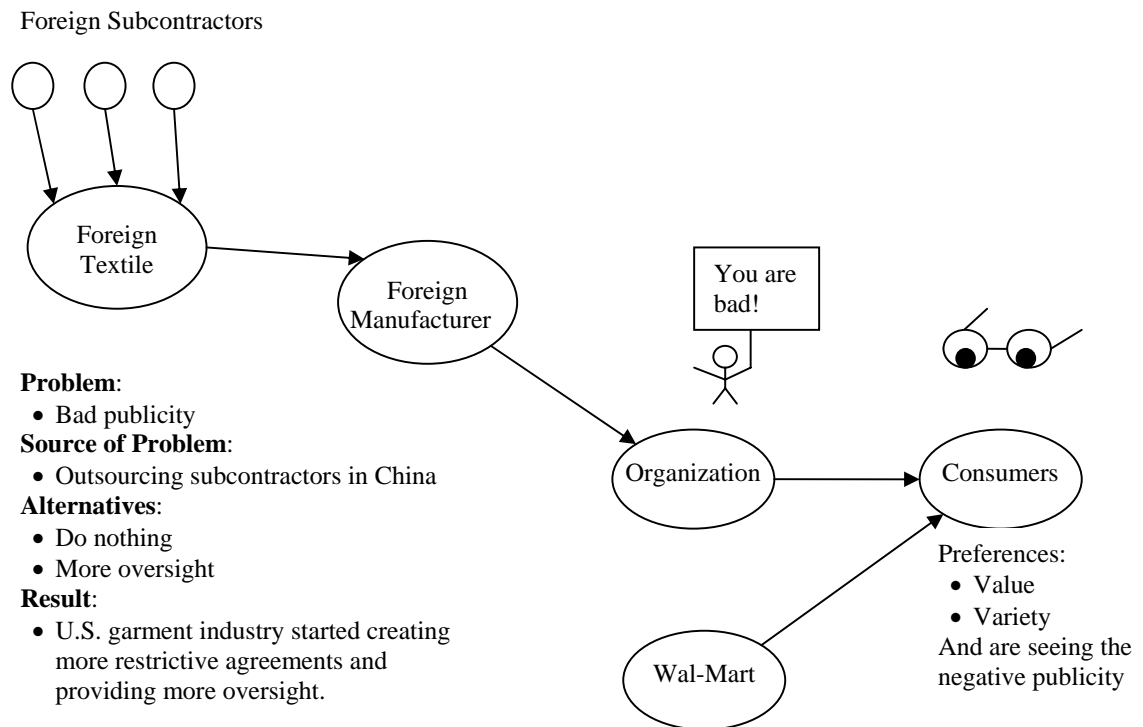


Figure 5. Detailed System in the late-1990's

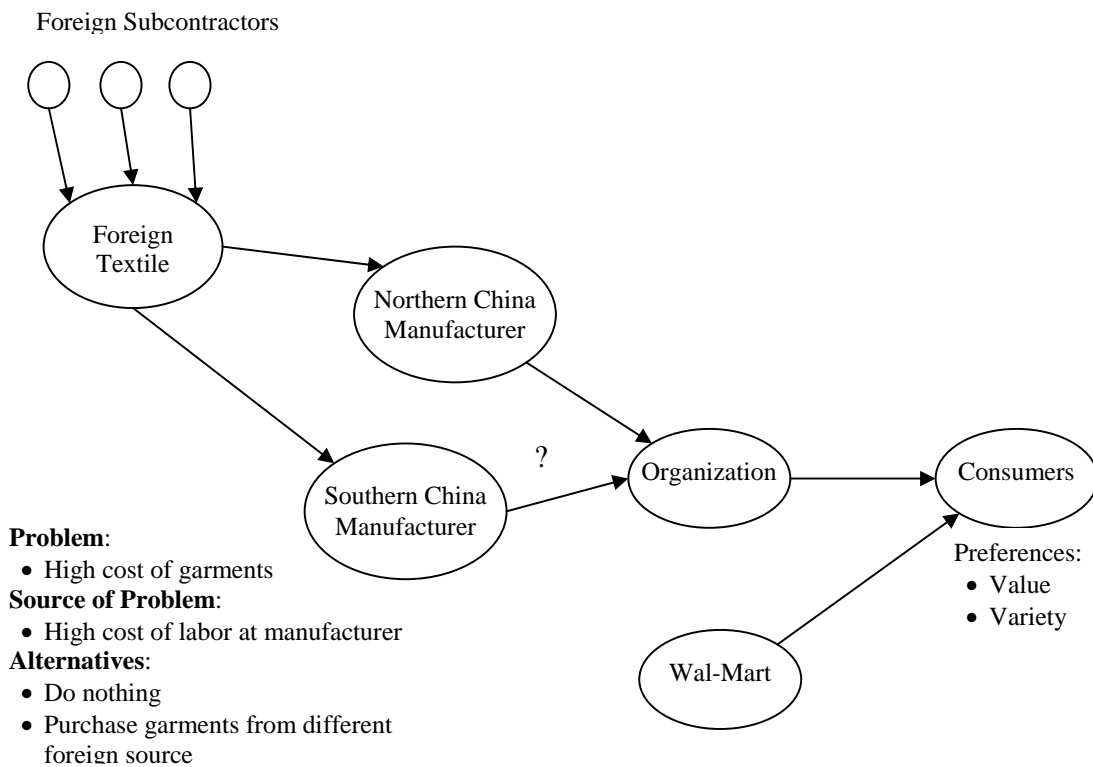


Figure 6. Detailed System in 2008

Depending upon the availability and capability of the whiteboards in the room we are often able to have all five figures on the board at once. This allows us to conclude the activity by revisiting the detail associated with each decision point and to talk again about how the complexity of a system changes over time.

III. EFFECTIVENESS

Anecdotal evidence suggests that the activity is well-liked and that the students' better understand the difference between the detailed complexity of systems and the dynamic complexity of systems (i.e., better than when we only lectured on systems thinking and assigned readings). Subsequent responses to exam questions and application of the concepts in current-topic presentations also suggest that students are able to apply the concepts to specific situations.

In order to make the role play personalized and somewhat entertaining we add a few details in the script that will make one or more students smile. For example, in the script included in this manuscript we changed the company headquarters (see late-1990's) to be Emmett, Idaho; a small town from where one of the students came. Also, in a previous lecture a professor introduced the terms *industry* environment and the *macro* environment by drawing a picture of the organization in the middle and the industry and macro environments as rings around the outside, looking similar to a donut; then recited for the students something called the Dunker's Creed: *Always pay attention to the donut (i.e., the environment) and not just the hole (i.e., the organization)*. We added a reference to this in the scenario as well. Students generally laugh at the reference and the student from the small town will often come up after class and ask in an interested fashion why we selected that town.

IV. REFERENCES

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V. APPENDICES

Systems Thinking and International Business

Context: Apparel Industry in the U.S. We are decision-makers for an apparel retailer (e.g., Lands End, Eddie Bauer).

Some time in the 1970's

Accountant: After looking over our financial statements and talking with our purchasing people it seems pretty clear that the costs of the garments we buy from our manufacturers here in the U.S. are pretty high and will probably get only higher.

Manager: Why is that? What is driving the costs so high.

Buyer: I can probably answer that. As you know before I came here I worked for a garment manufacturer. The problem with garment manufacturing is that the process is very labor intensive. Sewing and inspecting garments requires a lot of handwork.

Manager: Well, what do you propose?

Accountant: I think that we should switch to purchasing garments from the U.S. to foreign manufacturers. Labor costs are significantly lower abroad. It would save a ton of money.

Instructor: Sounds like something to consider. What do you others think?

Marketer: I can appreciate the issue of garment costs, and how they have an impact on our margins. One thing that our marketing research is telling us is that consumers here in the U.S. want value – which means that they look at the balance between price and quality. Another thing that is clear from the research is that consumers are willing to pay a fairly large premium for American-made garments because they feel that American garments are higher quality. I think going abroad for our garments would help our costs but I don't think that many of our customers would go for it. I think we should stay with U.S. manufacturers but look for other ways to lower costs and to increase quality. Then we can emphasize quality in our promotional campaigns to consumers. I am sure they will pay for it as long as we make good on their expectations of higher quality.

Quality Control Specialist: One thing I know from inspecting the garments that come from our manufacturers and the returns we get from consumers is that a major difference between the garments that hold up versus the ones with defects is the quality of the textiles – not necessarily problems with cutting and sewing the material into a garment. One way we might be able to cut some costs is to buy textiles direct from the suppliers – take more control over the quality of the textiles that the manufacturers use to make our products. We wouldn't cut out the manufacturers; we'll just be taking control of the quality of the textiles that go into the garments.

Some time in the 1980's

Marketer: Our latest round of consumer focus groups and information we are getting from trade organizations is that consumers are spending less of their discretionary income on apparel and they are not willing to pay a large premium for made in America products like they did back in the 70's. It is still clear that consumers want value (lower price for a given level of quality), but made-in-America doesn't seem to be as critical in forming consumers perceptions of quality. Maybe it is time for us to buy our garments from foreign garment manufacturers.

Manager: What do you others think?

Legal: I can appreciate the need to consider lower cost methods of manufacturing the garments. However, one thing that we need to remember is that as part of GATT (i.e., [General Agreement on Tariffs and Trade](#)) our country has negotiated bilateral agreements that set quotas on the importation of garments into the U.S. These quotas plus certain tariffs on apparel make it difficult to justify importing significant amounts of garments into this country from abroad and doing so with out added costs. If cost is the issue I don't think we can solve it by manufacturing garments abroad.

Buyer: I'm not an expert on GATT, [quotas](#), and [tariffs](#), but I know that many U.S. garment manufacturers import the textiles that they use to manufacture garments. If it isn't practical to import garments, maybe we can get around some of the tariffs and quotas on garment imports by importing the textiles, and continuing to have our current U.S. manufacturers assemble the garments. Textile production is also a labor-intensive process. By moving to a foreign supplier where labor costs are lower we can probably save considerable amounts of money.

Some time in the Mid-1990's

Marketer: Our marketing research efforts are turning up some disconcerting findings. Consumers seem to be increasingly demanding high quality at low prices. It seems that our every day prices on garments are at the level we would normally reserve for a sale. Every day seems to be a sale. You'd think we had become the Macys. We think that this is driven, in part, by the lower cost apparel that is being offered through the big stores, like Wal Mart. They have such big purchasing power that they can get lower prices from the garment manufacturers and then pass those savings on by lowering their prices to consumers. To make matters worse, consumers seem to be demanding greater variety along with the lower prices AND high quality. I think we need to go back to our manufacturers and demand lower prices and to get them to be more responsive to the need to produce a greater variety of product styles, sizes, and colors.

Buyer: I just don't think it is going to happen. With all of the labor laws in the U.S., federal minimum wage standards, and the pressure manufacturers get from labor groups I don't see getting too many price concessions from the manufacturers. We don't buy in volumes like Wal Mart. In addition, the manufacturers here in the U.S. are not set up to produce a wide variety of products. They scream every time I ask for smaller batch sizes and when I tell them that we want a wider array of colors and sizes in a specific product. It is too bad these trade agreements restrict our ability to go abroad. I know that labor costs are lower abroad and I am sure we can find a company in a developing country that would love our business enough that they would be willing to meet our needs for greater product variety.

Legal: There have been some changes in the [GATT](#) agreements – as you may know GATT has been around for many years – and that it gets “edited” or modified over time as participating countries negotiate new agreements. I think each of these periods of negotiation is called a “round”.

Buyer: What is your point?

Legal: Well what I was getting to is that the latest round of [GATT](#) - the same one that created the [World Trade Organization](#) - also established a phase-out of many of the quotas and tariffs on apparel. This may be the time to look at moving our business to foreign manufacturers.

Buyer: I know that in countries like China the minimum wage for this type of work can be as low as 13 cents per hour. Even with the extra transportation costs it would seem that in the short term while tariffs are still in place, but reducing, we could make a go of this. And once the trade barriers are eliminated we'll be in a pretty good position.

Late 1990's

Marketer: We have a serious problem facing us.

Buyer: What is it?

Marketer: In marketing, publicity can either help you or hurt you. On the one hand, when we get publicity in the press that is positive – like in 1980 when we donated money and resources to help during the clean up after Mt. St. Helens in Washington State erupted – it was like getting free advertising for the company. Unfortunately, it can work the other way as well. A few minutes ago a [human rights group](#) began picketing here outside our headquarters in Emmett Idaho, claiming that we use sweatshops to produce the garments we sell in our store.

Buyer: That can't be. I have been to our manufacturing facility in Northern China and the facility is well run; they don't use child labor; and they work only sixty-

hour workweeks. Our business has really improved the quality of life in that part of the country since we went there. What could they be complaining about?

Marketer: You are right about the manufacturing facility in Northern China. The quality of life has really improved since we started doing business there a few years ago. What the picketers are saying is that the company where we buy the textiles that are used by the manufacturing plant in Northern China uses some subcontractors to meet their orders, and one of these subcontractors has really poor working conditions. I guess we are guilty by association.

Buyer: Oh man. My head is starting to hurt. Here we are increasing our shareholder's value by providing a good price to our customers for a given level of quality, and in the process we are upgrading the quality of life for people living in Northern China, but all we get is grief over the behavior of a subcontractor of a supplier. Where does our responsibility end?For some reason all I can think of right now is something I heard from one of my professors in college – "Where ever you go – what ever you do – always keep your eyes on the doughnut and not on the hole" – I still don't know what it means but for some reason I think it applies in this situation.

December 1, 2008

Buyer: Our venture into the international arena sure hasn't been easy, and it seems like the main thing that we can plan on is change. Life must've been easier back in the 70's when [break dancing](#), [Neil Young](#), and [Animal House](#) were popular, and when consumers of apparel were willing to pay a premium for a limited variety of U.S. made products.

Marketer: Yeah. Consumers' preferences have sure changed over the years and advocacy groups seem to be more vocal. Now consumers are demanding quicker response times – with the web they seem to want their purchases now. When we forecast demand incorrectly and end up out of stock for an item our customers won't wait more than a few weeks for us to fill the order. We are starting to keep uncut fabric on hand at the factory just in case we guessed wrong on the demand for certain sizes, and we are starting to use un-dyed fabric so that we can quickly respond when we guessed incorrectly on the demand for certain colors. The problems seem to never end.

Accounting: Well, if you want problems I've got a new one for you. I have been watching the costs of garments coming out of our Northern China factory, and they continue to go up.

Buyer: That is to be expected. When we went in there Northern China was just beginning to develop economically. When we brought in our business other U.S. companies came with us. The result was that we helped improve the working and living conditions for the people in that region. In that part of the country

companies are publicly owned and must now pay their employees a minimum wage of 50 cents per hour. Workers within northern territories are granted health and social security benefits, workman's compensation, child-care, sick days, continuing education, and pension insurance. Excessive overtime is actually a legal offense. Overtime is reimbursed and subcontracting and part time work is prohibited. You can clearly see how the business that we brought to the region has really helped it develop.

Accounting: In many ways Northern China has become like the U.S. garment industry was in the 70's and 80's. I think it is time we consider moving on, just like we had to do with our relationships with the U.S. textile and garment manufacturers.

Buyer: What did you have in mind?

Accounting: From what I have read Southern China is a good option. In the south companies are privately-owned and can pay as low as 13 cents per hour. Workers are not exposed to all of the benefits that they get in the north with the state-owned companies. In addition, there are now restrictions on overtime. And, workers are hired on a contingency basis. This means that when there is work, the workers get paid; but when there is no work, payment is also withheld. In the South, there is less concern for health and safety protections, and worker and corporate taxes are also less. In many ways it is like Northern China when we went there.

ABOUT THE AUTHOR

Daniel M. Eveleth is Associate Professor of Management and Human Resources at the University of Idaho. Dr. Eveleth's research interests include: expertise, knowledge management, virtual leadership, and analogical reasoning.